

REMARKS

Claims 1-23 are pending and stand rejected as final. Claim 23 has been canceled without prejudice or disclaimer to the subject matter claimed therein. Claim 1 has been amended. New claim 24 has been added. Applicants respectfully request reconsideration of the rejection in view of the following remarks.

Applicants respectfully submit that support for the claimed “non-graphitized” coating of independent claim 1 derives from Example IV of the specification (which also refers back to Example II). Specifically, the phenolic resin coating is pyrolyzed during processing, (at a temperature of about 900°C), but graphitizing requires much higher temperatures. The Papenburg Patent supports this, as he graphitized at a temperature above about 2000°C. Thus, the pyrolyzed epoxy and phenolic resins of the Examples are non-graphitic, and as such are supportive of the claim.

Applicants respectfully submit that support for the claimed substrate CTE between -0.46 and +1.75 ppm/K can be found in Table I, right-hand column.

The 35 USC §112 Rejections

The specification was objected to under 35 U.S.C. §112, first paragraph, on the grounds that the specification, as originally filed, does not provide support for the invention as is now claimed. In a related matter, independent claims 1 and 18 and their dependents were rejected under 35 U.S.C. §112, first paragraph, for failing to comply with the written description requirement. Applicants respectfully traverse this objection and rejection.

With regard to the claimed “non-graphite” coatings, Applicants respectfully submit that this limitation is inherently disclosed in the specification as originally filed. To this end, enclosed please find as an Appendix, a Declaration of co-inventor Dr. Prashant Karandikar. The gist of Dr. Karandikar’s statement is that, under his processing conditions, his carbon coatings are never

graphitic in nature. Graphitizing requires temperatures that are much higher than what Applicants use, and so carbon coatings remain ungraphitized.

With specific regard to the claimed “amorphous silicon”, Applicants respectfully submit that this limitation can be found in the original specification at, for example, Paragraph [093], which discusses applying an amorphous silicon coating to the mirror substrate, and specifically by a plasma-enhanced chemical vapor deposition technique.

Accordingly, Applicants respectfully request that the objection and the rejection be withdrawn.

The Prior Art Rejections

Claims 12-23 were rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,505,805 to Papenburg et al. (hereinafter referred to as “Papenburg”). Applicants respectfully submit that cancellation of independent claim 23 renders this rejection moot as it applies to this claim. Applicants respectfully traverse this rejection with respect to the other claims.

Specifically, Applicants respectfully submit that Papenburg neither discloses nor suggests the claimed **non-graphitic carbon coating** of independent claim 1 and its dependents. The Declaration of Dr. Karandikar shows that the pyrolyzed carbon coatings expressly disclosed in the original specification (see, for example, Paragraph [079]) are inherently non-graphitic. More specifically, it states that substantially higher temperatures than what is disclosed in the instant invention are needed to form the graphite form of carbon. The ability to make useful carbon coatings without having to graphitize them is a significant advance in the art. For example, previous investigators thought that graphite was more chemically protective than other forms of carbon, and that graphite coatings were necessary to chemically protect carbon fibers.

Applicants’ invention shows chemical protection of carbon fibers using carbonaceous coatings that have not been graphitized. Thus, Applicants have broadened and extended the usefulness of this class of composite materials (e.g., coated carbon fibers in a matrix). While significant in

itself, this is even more significant considering the economic savings in not having to heat to such high temperatures, e.g., graphitizing temperatures.

In contrast, in Papenburg, “The CFC block or honeycomb structures so obtained are then preferably heated in vacuum or protective atmosphere to temperatures of more than 2000°C, to achieve at least a partial **graphitizing** of the carbon matrix and fibers.” (Column 7, lines 13-16).

As for independent claim 18 and its dependents, Applicants respectfully submit that Papenburg neither discloses nor suggests the claimed **amorphous** silicon coating. The silicon coatings or layers of Papenburg are each **crystalline**: “The silicon can have an isotropic or polycrystalline structure.” (col. 6, lines 31-32) Among the advantages of the amorphous coating of the instant invention is that amorphous silicon coatings can be polished to a better finish (e.g., lower surface roughness) than can crystalline silicon coatings.

Accordingly, Applicants respectfully request that this rejection be withdrawn.

Applicants respectfully submit that the invention of new independent claim 24 is also patentable over Papenburg because Papenburg neither discloses nor suggests the claimed substrate having a CTE between -0.46 and +1.75 ppm/K. Papenburg discloses a CTE of about 2 ppm/K (col. 12, lines 63-67). Applicants appreciate that this is exemplary only, but seemingly, if another of his substrate materials possessed a lower CTE than this, he would have mentioned it.

Claims 10 and 11 were rejected under 35 U.S.C. §103(a) as being unpatentable over Papenburg in view of U.S. Patent No. 5,643,663 to Bommier et al. (hereinafter referred to as “Bommier”) for the reasons set forth in the previous rejection. Applicants respectfully traverse this rejection.

The Action considers Papenburg as disclosing all aspects of these claims except that the carbon fibers are woven, and that Bommier discloses woven carbon fibers.

In response, Applicants respectfully submit that Papenburg neither discloses nor suggests the claimed non-graphitic carbon coating of independent claim 1. Further, Bommier fails to remedy this deficiency in Papenburg, Applicants respectfully submit.

Accordingly, this rejection should be withdrawn.

In view of the amendments and remarks herein, Applicants respectfully submit that the instant application is in condition for allowance. Accordingly, Applicants respectfully request issuance of a Notice of Allowance directed to claims 1-22 and 24.

Should the Examiner deem that any further action on the part of Applicants would be desirable, the Examiner is invited to telephone Applicants' undersigned representative.

Respectfully submitted,


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